

# Recovery Plan Action Status

Plan Name: Star Cactus (*Astrophytum asterias*) Recovery Plan

Plan Status: Final

Plan Date: 06-Nov-03

Lead Agency: USFWS

Lead Office: Corpus Christi Ecological Services Field Office

(361)  
994-9005 )

Species	Action Priority #	Action #	Action Description	Action Status	Est. Initiation Date	Est. Completion Date	Responsible Parties	Work Type	Labor Type	Action Comments
Star cactus ( <i>Astrophytum asterias</i> )	1	1.1	Landowner involvement and outreach.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas Parks and Wildlife Department	Other: Information and Education	Contract	Continue to provide information to landowners for protection of the cactus. FY08, G. Janssen contacted landowners. In 2011 TNC Conservation and Restoration of Star Cactus Final Report, plant surveys were reviewed with land owners, Peyote sellers were educated on proper identification to reduce misidentification and identification cards were distributed for field use.

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Star cactus (Astrophytum asterias)	1	1.2	Develop and implement star cactus stewardship agreements with voluntary landowners whose long and short term land-use goals are compatible with star cactus recovery needs.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas Parks and Wildlife Department	Acquisition: Easement	Internal Administrative	Cost will depend on number of populations found on private land and willingness of landowners to promote star cactus recovery. Costs may continue through Year 10 at an approximate cost of \$4,000/year. In FY08, G. Janssen contacted landowners. Eight cooperative agreements with land owners have been signed. These agreements protect 2,835 acres with A. asterias located on the property (TNC Conservation and Restoration of Star Cactus Final Report, 2011). TNC has purchased property to protect and manage Star cactus (Las Estrellas Preserve).
Star cactus (Astrophytum asterias)	1	1.3	Enforce applicable laws and regulations.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, Ecological Services Division, U.S. Fish and Wildlife Service, U.S. Fish and Wildlife Service, Law Enforcement Division, U.S. Fish and Wildlife Service National Wildlife Refuge System, Texas Parks and Wildlife Department	Other: Law Enforcement, Other: Regulations	Internal Field Assistance	Ongoing as needed throughout recovery program; may increase as information on threat of illegal collection is quantified.
Star cactus (Astrophytum asterias)	2	2.1.1	Study soils and underlying geology.	Partially Complete	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Habitat Requirements	Species Expert	In a 2010 Sec. 6 Final Report, soil surveys within subpopulations were examined.

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Star cactus (Astrophytum asterias)	2	2.1.2	Determine community structure.	Ongoing Not Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Demographic Studies, Research: Population Surveys	Species Expert	In 2010, completed a Sec. 6 Final Report that included vegetative community members including most prevalent within survey transects, species within 2-m belt of transect, and species associated with pilot reintroduction project; this was then compared with the soil data.
Star cactus (Astrophytum asterias)	1	2.1.3.1	Study effects of land use practices on star cactus and its associated habitat.	Unknown	FY 2000 - FY 2004		U.S. Department of Transportation, U.S. Environmental Protection Agency, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, Texas Department of Transportation, University of Texas - Pan American, Natural Resources Conservation Association	Research: Habitat Status	Species Expert	
Star cactus (Astrophytum asterias)	3	2.1.3.2	Study responses to periodic or cyclic processes such as flooding, fire, drought, and freezing temperatures.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Ecosystem Studies	Graduate Student, Species Expert	In FY08, Texas State University studied mammalian and insect herbivory.

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Star cactus (Astrophytum asterias)	2	2.1.3.3	Study interactions with other species.	Unknown	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Competition, Research: Disease, Research: Predation	Species Expert	In FY10, a Sec. 6 Final Report looked at herbivory using motion-sensor cameras and quadrats to identify herbivores; also found mammalian and insect herbivory. The report also investigated A. asteria association with other plants and objects (i.e. rocks).
Star cactus (Astrophytum asterias)	1	2.2.1	Conduct demographic analysis of the populations.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Demographic Studies	Species Expert	In 2010, completed a Sec. 6 Final Report included demographic analysis of 7 transects on 4 properties from 2004-2009.
Star cactus (Astrophytum asterias)	2	2.2.2	Characterize phenology	Ongoing Not Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Other Information	Species Expert	In FY2010, a TPWD Final Report investigated phenology patterns that also included the timing of fruit and floral development and fruit and seed production.
Star cactus (Astrophytum asterias)	2	2.2.3	Study pollination biology.	Ongoing Not Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Propagation	Species Expert	In 2010, a Sec. 6 Final Report was conducted that looked at pollinator limitation, insect visitors, pollinator effectiveness, pollen dispersal, and associate cacti insect visitors (TPWD, Final Report 2010).

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Star cactus (Astrophytum asterias)	2	2.2.4	Study seed production and dispersal in the wild.	Ongoing Not Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Work type not yet selected	Species Expert	In FY2010, a Sec. 6 Final Report from TPWD looked at breeding systems and outcrossing distances needed for pollination.
Star cactus (Astrophytum asterias)	2	2.2.5	Study seedling recruitment.	Ongoing Not Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Other Information	Species Expert	FY08, TPWD monitored recruitment. Demographic studies and research included a small portion on seedling establishment, along with the pilot reintroduction. results suggest that rainfall is the determining factor in successful establishment.

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Star cactus (Astrophytum asterias)	2	2.2.6	Research genetics	Partially Complete	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Genetics	Species Expert	In 2006, Dr. Martin Terry published a paper on the development of polymorphic microsatellite markers for Star Cactus. He found that three of the populations had high levels of heterozygosity and genetic diversity, considering their small sizes. The fourth population, which was the smallest and isolated by distance from the other populations had low levels of heterozygosity and genetic diversity. He has isolated DNA from two additional populations and these data and data from any additional populations located in the next year will be included in a final larger analysis.
Star cactus (Astrophytum asterias)	2	2.3	Develop management/monitoring programs for existing and reintroduced populations.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, University of Texas - Pan American	Research: Population Surveys	Species Expert	Development of management/monitoring programs should continue as needed.

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Star cactus (Astrophytum asterias)	1	3	Search for new populations.	Ongoing Not Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas A&M University, Texas Parks and Wildlife Department, Texas Department of Transportation, Universidad Autónoma de Tamaulipas, Universidad Nacional Autónoma de México, University of Texas - Pan American	Research: Population Surveys	Internal Field Assistance, Species Expert	Surveys should continue as needed. FY08, Janssen Biol., Inc. surveyed for new populations and found at least 1. According to the 2010 Sec. 6 Final Report from TPWD, there are currently 25 populations however, surveying has been spotty.
Star cactus (Astrophytum asterias)	1	4	Establish a botanical garden	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, Center for Plant Conservation, San Antonio Botanical Gardens	Management: Propagation	Species Expert	FY08: LBJWC has outline of cultivation; DBG is also seed banking. As of 2011, 3 Star Cactus individuals are in the "living collection", and as of May 2011, 9,923-10,041 seeds are currently stored and maintained at DBG seed room.
Star cactus (Astrophytum asterias)	2	5	Establish new populations if necessary.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Center for Plant Conservation, Texas Parks and Wildlife Department	Management: Propagation	Species Expert	Costs may continue through Year 10, as necessary. In Spring of FY07 and fall of FY08, 120 seeds and 120 seedlings planted in plots at TNC's Las Estrellas Preserve; monitoring of germination and survival. Results from the 2007 Pilot Reintroduction: Of the seeds and seedlings planted in the spring and fall, only 5 and 4 seeds and 78 and 87 seedlings, respectively, survived the 14 month observation period (2010 Sect. 6 Final Report).

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Star cactus (Astrophytum asterias)	2	6	Develop and implement a formal conservation agreement for star cactus between the United States and Mexico.	Unknown	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, Universidad Autónoma de Tamaulipas, Universidad Nacional Autónoma de México, Universidad de Nuevo León	Other: Administration, Other: Regulations	Internal Technical Assistance, Species Expert	Cost estimates will be developed when interested parties have been identified; would include meeting/travel cost. No agreement has been obtained as of July 2011.
Star cactus (Astrophytum asterias)	1	7	Develop a public information and awareness program.	Unknown	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, Ecological Services Division, U.S. Fish and Wildlife Service, U.S. Fish and Wildlife Service, Law Enforcement Division, U.S. Fish and Wildlife Service National Wildlife Refuge System, The Nature Conservancy, Texas Parks and Wildlife Department, Universidad Autónoma de Tamaulipas, Universidad Nacional Autónoma de México, Natural Resources Conservation Service	Other: Information and Education	Species Expert	
Star cactus (Astrophytum asterias)	3	8	Evaluate progress toward recovery, management direction, and status of information needed to develop delisting criteria within five years.	Ongoing Current	FY 2000 - FY 2004		U.S. Fish and Wildlife Service, The Nature Conservancy, Texas Parks and Wildlife Department, Universidad Autónoma de Tamaulipas, Universidad Nacional Autónoma de México, Universidad de Nuevo León	Management: General	Internal Field Assistance, Internal Technical Assistance, Species Expert	Cost of this action can not be estimated until progress in Actions 1-6 is achieved. If significant adaptation to management is not needed, costs will be negligible. If a recovery team is convened (or other significant action taken), costs could include meeting, travel, or related costs. A 5 year review has been initiated.